

Factors Associated With Low Birth Weight

United States, 1976

An analytic study of demographic, socioeconomic, and health factors associated with low birth weight and a review of recent trends in low birth weight incidence, based on data reported on birth certificates.

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SYMBOLS

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FACTORS ASSOCIATED WITH LOW BIRTH WEIGHT

Selma Taffel, Division of Vital Statistics

INTRODUCTION

The physical maturity of a newborn infant can be judged by its weight at birth or its gestational age (number of completed weeks of pregnancy measured from the first day of the last normal menstrual period). Weight at birth has been used more widely because it is accurately and completely reported; the accuracy of gestational age, however, depends on the mother's correct recall of the date of the last menstrual period.

Infants weighing 2,500 grams (5 1/2 pounds) or less at birth are considered to be of low birth weight. This criterion was recommended by the American Academy of Pediatrics in 1935 and adopted by the World Health Organization in the *Sixth Revision of the International Lists of Diseases and Causes of Death* (1948). Low-birth-weight infants may be either premature, that is, born before 37 weeks of gestation, or full term but small for their gestational age.

The association between low birth weight and a greatly elevated risk of infant mortality,^{1,2} congenital malformations,³ mental retardation,⁴ and other physical and neurological impairments^{5,6} is well established. A recent survey⁷ indicates that low-birth-weight infants are likely to have low Apgar scores^a and to be delivered by

^aThe Apgar score is an international code for the clinical evaluation of an infant's physiological condition 1 and 5 minutes after birth. A low score indicates some doubt about the survival and subsequent health of the infant.

cesarean section or in a breech position, with the associated dangers to both mother and child.

Although only a relatively small proportion of all newborns are of low birth weight, this group of births accounts for more than half of all infant deaths (under 1 year), and nearly three-quarters of all neonatal deaths (under 28 days), according to a national study of matched birth and infant death certificates.¹ In light of the large number of deaths and the severe physical and mental handicaps that often accompany low birth weight, increasing attention has been focused on some of the associated factors.

This report describes the patterns of occurrence of low birth weight in the United States relative to demographic and health characteristics recorded on birth certificates. In addition, recent trends in the incidence of low birth weight are examined. The information presented here is derived from entries on live birth certificates filed throughout the United States. However, when describing certain variables, for example, education or marital status of the mother, the data are drawn from a more limited group of reporting States, since not all State birth certificates include questions on some items. (See appendix I for a list of reporting areas for each variable.)

SUMMARY OF PRINCIPAL FINDINGS

According to information derived from 1976 birth certificates, the incidence of low birth weight in the United States varies widely by race and by mother's age, marital status, place of residence, nativity, and pregnancy history. However, the socioeconomic status of the family as

measured by the mother's educational attainment appears to be one of the most critical factors in determining birth weight. The proportion of infants of low birth weight born to mothers with 16 years or more of education (4.9 percent) was half that of infants born to mothers with less than 9 years of education (9.9 percent).

From 1950 to the mid-1960's there was a gradual increase in the incidence of low birth weight in the United States from 7.5 percent to 8.3 percent, followed by a general decline in incidence in the next decade. However, by 1976, the incidence of low birth weight (7.3 percent) was only slightly below the 1950 level. The rise reflects the substantial increases in low birth weight among white infants for nonhospital deliveries and among all other^b infants for both hospital and nonhospital deliveries. For the entire period 1950-76, the incidence of low birth weight was consistently higher among all other infants than among white infants, and this difference increased progressively. By 1976, the risk of low birth weight was twice as great for infants of other races (12.1 percent) as for white infants (6.1 percent).

Comparing racial and ethnic groups, it was found that the incidence of low birth weight in 1976 was highest among black infants (13.0 percent) and lowest among Chinese infants (5.7 percent). Although black babies were far more likely than white babies to be of low birth weight when born at full term, among premature infants (less than 37 weeks' gestation), the incidence of low birth weight was, on the average, only slightly higher among black babies. Foreign-born mothers, regardless of race, were less apt to bear a low-birth-weight baby than were native-born mothers. For almost all racial and ethnic groups, higher levels of education were associated with a lower incidence of low birth weight.

Very young mothers and mothers in the later years of childbearing were most likely and mothers aged 25-29 years were least likely to bear a low-birth-weight baby. The incidence of low birth weight in 1976 ranged from 6.0 percent of infants born to 25-29-year-old mothers to 10.5 percent of infants born to 45-49-year-old mothers and 14.8 percent of infants born to girls

^bAs used throughout this report, the term "all other" refers to the combined grouping of all races other than white.

under 15 years of age. The risk of low birth weight for infants born to teenage mothers decreased with each successive year of the mother's age, declining to 8.8 percent of infants born to 19-year-old mothers.

For each age group, the incidence of low birth weight varied with the birth order of the child. The incidence was lowest for infants born to women 25-29 years old bearing their second child (5.1 percent), quite high for children born to women 15-19 years old bearing a fourth or higher order child (20.3 percent), and highest for babies born to girls under 15 years old bearing their second child (30.5 percent).

At all ages, unmarried mothers were more likely than were married mothers to bear a low-birth-weight baby. Overall, in 1976 the incidence of low birth weight was twice as high for infants born out of wedlock (12.6 percent) than for other infants (6.4 percent). Increasing educational attainment for both married and unmarried mothers was associated with a reduction in the incidence of low birth weight, but this was less pronounced for out-of-wedlock infants.

Regardless of age, mothers were least likely to bear a low-birth-weight baby when the interval between births was 2-4 years. The incidence of low birth weight was especially marked for fourth and higher order births to teenage mothers and mothers in their early twenties, an indication of the detrimental effect of the close spacing of births. The outcome of the previous pregnancy was also found to be related to the birth weight of the current birth—a previous pregnancy terminating in fetal death increased the likelihood that the current birth would be of low birth weight.

Although the initiation of prenatal care early in pregnancy was associated with a decline in the incidence of low birth weight, a substantial part of this decrease can be explained by the higher educational attainment of the mothers who started care early. Regardless of when prenatal care was begun, there was a higher risk of low birth weight among out-of-wedlock than among other infants.

Live births in plural deliveries were about 9 times as likely to be of low birth weight than were those in single deliveries (54.3 percent compared with 6.3 percent). Part of this difference is due to the reduced gestational period of infants in plural deliveries. Female babies were

more likely to be of low birth weight than were male babies regardless of whether the birth was single or part of a plural delivery.

Both white and black mothers living in large urban places were more likely than were mothers residing in small urban places to bear a low-birth-weight baby. The lowest incidence of low birth weight was among infants born to mothers residing in primarily rural areas. The proportion of low-birth-weight babies was highest in the South Region (8.0 percent) and lowest in the West Region (6.4 percent), but some of the regional differences were due to variations in the proportions of black births.

RECENT TRENDS IN THE INCIDENCE OF LOW BIRTH WEIGHT

Collecting low-birth-weight data on a national scale became possible in 1949 when the U.S. Standard Certificate of Live Birth was revised to include a question on birth weight; these national data were first published in 1950. From 1950 to the mid-1960's the incidence of low birth weight among all live births changed only slightly, increasing gradually from 7.5 percent in 1950 to 8.3 percent in 1965 and 1966. Since then, there has been a very gradual decline, but by 1976 the incidence of low birth weight (7.3 percent) was only slightly below the 1950 level of 7.5 percent (table 1 and figure 1).

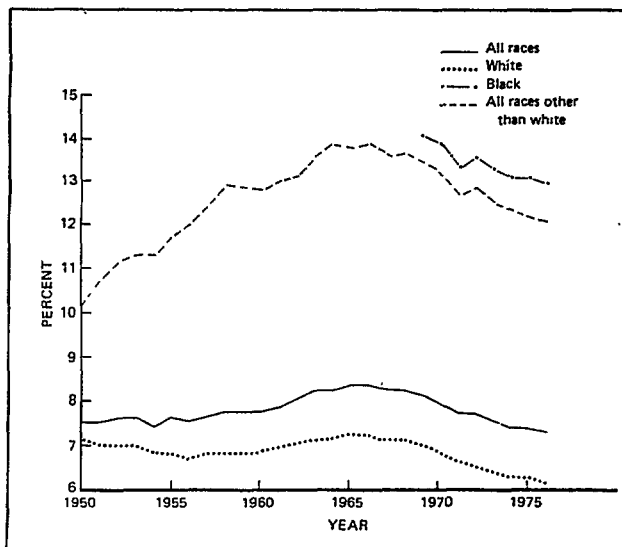


Figure 1. Percent of infants of low birth weight by race: United States, 1950-76

Among white infants, there was little change in the occurrence of low birth weight between 1950 and 1966, the proportion varying between 6.7 and 7.2 percent during this period. Since 1966, there has been a continuous decline in the proportion of infants of low birth weight, from 7.2 percent in 1966 to 6.1 percent in 1976. For all other infants the proportion low birth weight rose almost continuously from a low of 10.2 percent in 1950 to peaks of 13.9 percent in 1964 and 1966. This rise is a reflection of substantial increases in the incidence of low birth weight among both hospital- and nonhospital-delivered infants during this period. Only a small part of the increased incidence can be attributed to increases in completeness of birth registration and more accurate recording of birth weight which were concomitant with the rise in hospital deliveries. If there had been no change from 1950 to the late 1960's in the proportion of infants delivered in hospitals, the percent of infants of low birth weight would have risen from 10.2 percent in 1950 to 13.4 percent rather than the observed 13.7 in 1968. This observation is based on 1968 data adjusted by the direct method of standardization, since the necessary information is not available for the year 1966 (see appendix III).

Since 1966 there has been a gradual decline in the incidence of low birth weight for infants of all other races, but in 1976, the proportion low birth weight (12.1 percent) was higher than it had been in 1950 (10.2 percent). Weight at birth was not tabulated separately for black infants prior to 1969. From 1969 to 1976 the percent low birth weight among black infants declined from 14.1 percent to 13.0 percent.

During the entire period 1950-76, the percent low birth weight was consistently higher among all other than among white infants, and the difference between these groups has increased progressively. In 1950, the risk of low birth weight was 44 percent higher for all other than for white infants (10.2 percent compared with 7.1 percent); by 1976, the risk was twice as great for all other infants (12.1 percent compared with 6.1 percent).

Age and Birth Order Changes

Two factors strongly associated with an infant's weight at birth are the mother's age at

time of birth and the birth order of the child. (See "Age of Mother and Birth Order" in "Demographic Correlates".) These elements have undergone considerable change since 1950. For example, the proportion of infants born to teenagers increased from 12 percent to 18 percent of all births in the period 1950-76, concomitant with a drop in the proportion of infants born to mothers aged 35 years and over from 11 percent to 4 percent of all births. At the same time, first-order births increased from 32 percent to 42 percent of all births; fourth- and higher-order births halved in importance, from 21 percent to 11 percent of all births.

Teenage girls and older mothers are more likely than are women of other age groups to bear a low-birth-weight baby. Similarly, there is an increased risk of low birth weight for first births and fourth- and higher order births. However, as mentioned earlier, there have been compensatory changes since 1950 in the proportion of births in these high-risk groups. The question, therefore, arises as to how much of the fluctuation in the percent low birth weight since 1950 can be attributed to age and birth-order changes.

Information on birth weight by age of mother was not available prior to 1955, and information on the age of mother cross-classified by birth order was not available prior to 1965. An analysis of changes since 1955 in the ages at which white mothers were bearing children indicates that changes in age had only a minimal effect on either the rise in the percent low birth weight between 1955 and 1966 or on the subsequent drop following the 1966 peak. Changes in the ages at which all other mothers were bearing children tended to intensify slightly the rise in the percent low birth weight between 1955 and 1966 (by an additional 0.3 percentage points, or 2.5 percent). In other words, the percent low birth weight would have risen only 1.8 percentage points, rather than the observed 2.1 percentage points, if the age distribution of all other mothers had remained constant. However, from 1966 to 1976 changes in the age distribution of all other mothers had no effect on the decline in the percent low birth weight. (The direct method of standardization was used for this analysis; see appendix III.)

It was impossible to analyze the simultaneous effect of age of mother and birth-order changes on the percent low birth weight for

years prior to 1965. Figure 2 depicts the actual percent low birth weight for white and all other babies for the years 1966-76 and the hypothetical percents that would have occurred if there had been no change in the percent low birth weight for each age-order group since 1965. The solid and broken lines are the linear fits of these points from 1966 to 1976. The slope of the broken line represents the part of the decline in the percent low birth weight which is attributable to the change in the age-birth order distribution of births. The remainder of the decline, the difference between the broken line and the solid line, can be ascribed to other factors. For white infants, only 18 percent of the overall decline was due to changes in the age-birth-order distribution of births; for all other infants, the entire decline was due to other causes.

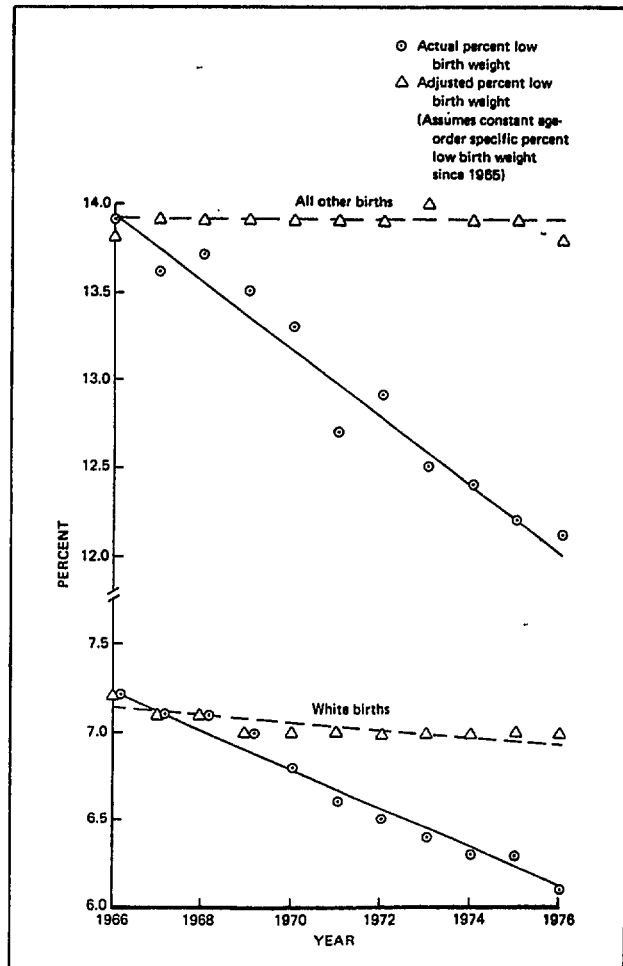


Figure 2. Actual and adjusted percent of infants of low birth weight, by color: United States, 1966-76

Many factors other than age, birth order, and place of delivery are known to be associated with low birth weight, and any changes over time in the prevalence of such factors would influence national trends in low birth weight. Low socioeconomic status,⁸ inadequate prenatal nutrition,^{9,10} alcohol consumption,¹¹ maternal smoking,¹² and lack of prenatal care¹³ have all been identified as contributory causes. Additionally, changes in the incidence of elective inductions¹⁴ and in contraceptive utilization and the frequency of abortion¹⁵ independent of their effect on age and birth order have a bearing on the overall incidence of low birth weight. It was not possible, from information available for this report, to analyze how trends in the overall incidence of low birth weight have been affected by such changes.

Weight Distribution Changes

To obtain a clearer picture of the patterns of low-birth-weight incidence, the percent distribution of infants by birth weight (500-gram intervals) for the years 1950, 1966, and 1976 are shown in table A.

During the period 1950-66 there was almost no change in the overall percent of low birth weight for white infants (from 7.1 percent in 1950 to 7.2 percent in 1966), and the weight distribution remained virtually the same, except for the moderate reduction of 18 percent in the proportion of very large babies (weighing 4,501 grams or more). For all other infants, the overall rise in the percent low birth weight (from 10.2 percent to 13.9 percent) reflects a distinct shift in the entire distribution toward lower weight.

In the period of declining incidence of low birth weight (1966-76), the shift from lower birth weight categories to higher ones was more pronounced for white than for all other infants. The greater reductions for white than for all other births in nearly all the lower weight categories are reflected in the sharper decline (15.3 percent) in the incidence of low birth weight for white infants than for all others (12.9 percent) during this period.

PERIOD OF GESTATION

It has become increasingly clear that there are major differences in the health status of low-birth-weight infants that are related to the

period of intrauterine growth. For example, low-birth-weight infants with very short gestational periods have a neonatal mortality rate about twice as high as that of other low-birth-weight infants, but low-birth-weight babies with the longest gestational periods are more likely to be born with severe congenital anomalies.¹⁶ It is presumed that the low birth weight of babies born at or near full term reflects intrauterine maldevelopment and/or retarded growth.¹⁷

In 1976, 55 percent of all low-birth-weight babies were born prematurely, that is, with gestational periods of less than 37 weeks; 45 percent were full-term births (table B). There was little difference between races in the incidence of prematurity among low-birth-weight infants; 54 percent of white infants and 56 percent of black infants were born prematurely. However, as shown in table B, there was a greater likelihood that black infants would have extremely short gestational periods.

Black babies were far more likely than white babies to be of low birth weight when born at full term (6.3 percent compared with 2.8 percent) but among premature babies, the incidence of low birth weight was, on the average, only slightly higher among black babies (42.9 percent compared with 41.9 percent). Indeed, up to 36 weeks of gestation, the incidence of low birth weight was lower for black than for white babies (table 2 and figure 3). In 1976 the median weight of black infants born before 36 weeks of gestation was about 60 grams more than that of white infants, but at longer gestational periods, blacks infants weighed an average of 200 grams less than white infants. Thus it appears that the fetal growth of black babies is generally slower than that of white babies in late pregnancy despite an initial advantage. It has been hypothesized that social disadvantage may be the critical factor explaining this racial difference in birth weight at later gestational ages. Several studies have shown a relationship between growth retardation in late pregnancy and adverse social or environmental conditions.^{18,19}

DEMOGRAPHIC CORRELATES

Race and Mother's Nativity

Two of the most important predictors of birth weight are the race of the child and

Table A. Number and percent distribution of infants by birth weight and color: United States, 1950, 1966, and 1976

Color and year	Total	Birth weight										Not stated
		2,500 grams or less	1,000 grams or less	1,001-1,500 grams	1,501-2,000 grams	2,001-2,500 grams	2,501-3,000 grams	3,001-3,500 grams	3,501-4,000 grams	4,001-4,500 grams	4,501 grams or more	
All races												
Number												
1976.....	3,167,788	229,375	16,903	19,546	44,691	148,235	543,549	1,185,890	886,433	259,061	54,234	9,246
1966.....	3,606,274	300,354	19,980	24,688	56,650	199,036	713,464	1,382,170	913,296	240,970	47,946	8,074
1950 ¹	3,554,149	249,054	14,114	19,928	46,441	168,571	607,855	1,259,213	892,047	248,949	63,682	233,349
Percent distribution ²												
1976.....	100.0	7.3	0.5	0.6	1.4	4.7	17.2	37.5	28.1	8.2	1.7	...
1966.....	100.0	8.3	0.6	0.7	1.6	5.5	19.8	38.4	25.4	6.7	1.3	...
1950.....	100.0	7.5	0.4	0.6	1.4	5.1	18.3	37.9	26.9	7.5	1.9	...
Percent change												
1966-76.....	...	-12.0	-16.7	-14.3	-12.5	-14.5	-13.1	-2.3	10.6	22.4	30.8	...
1950-66.....	...	10.7	50.0	11.7	14.3	7.8	8.2	1.3	-5.6	-10.7	-31.6	...
White												
Number												
1976.....	2,567,614	156,977	10,493	12,836	30,424	103,224	397,951	954,073	768,354	233,471	49,361	7,427
1966.....	2,993,230	215,720	13,326	16,870	40,302	145,222	551,166	1,154,786	805,504	217,726	42,504	5,824
1950 ¹	3,063,627	202,010	11,482	15,855	37,478	137,195	509,521	1,096,735	787,507	217,336	48,606	201,912
Percent distribution ²												
1976.....	100.0	6.1	0.4	0.5	1.2	4.0	15.5	37.3	30.0	9.1	1.9	...
1966.....	100.0	7.2	0.4	0.6	1.3	4.9	18.4	38.7	27.0	7.3	1.4	...
1950.....	100.0	7.1	0.4	0.6	1.3	4.8	17.8	38.3	27.5	7.6	1.7	...
Percent change												
1966-76.....	...	-15.3	-	-16.7	-7.7	-18.4	-15.8	-3.6	11.1	24.7	35.7	...
1950-66.....	...	1.4	-	-	-	2.1	3.4	1.0	-1.8	-3.9	-17.6	...
All other												
Number												
1976.....	600,174	72,398	6,410	6,710	14,267	45,011	145,598	231,817	118,079	25,590	4,873	1,819
1966.....	613,044	84,634	6,654	7,818	16,348	53,814	162,298	227,384	107,792	23,244	5,442	2,250
1950 ¹	490,522	47,044	2,632	4,073	8,963	31,376	98,334	162,478	104,540	31,613	15,076	31,437
Percent distribution ²												
1976.....	100.0	12.1	1.1	1.1	2.4	7.5	24.3	38.7	19.7	4.3	0.8	...
1966.....	100.0	13.9	1.1	1.3	2.7	8.8	26.6	37.2	17.6	3.8	0.9	...
1950.....	100.0	10.2	0.6	0.9	2.0	6.8	21.4	35.4	22.8	6.9	3.3	...
Percent change												
1966-76.....	...	-12.9	-	-15.4	-11.1	-14.8	-8.6	4.0	11.9	13.2	-11.1	...
1950-66.....	...	36.3	83.3	44.4	35.0	29.4	24.3	5.1	-22.8	-44.9	-72.7	...

¹In 1950 birth weight was not recorded for births in Connecticut and Massachusetts. Births in these States are included in the "not stated" classification.
²Total excludes not stated birth weight.

whether the mother is native- or foreign-born. As shown in table C, there are very large variations among the major racial groups in the incidence of low birth weight. Black babies are more than twice as likely as white babies are to be of low birth weight. In 1976 the percent of infants of low birth weight was 13.0 percent among black babies compared with 6.1 percent

among white babies. The lowest incidence was for Chinese-American babies (5.7 percent); the levels for American Indian babies (6.9 percent) and Japanese-American babies (7.2 percent) were higher than those for white babies, but substantially less than those for black babies.

In general, foreign-born mothers, regardless of race, were less apt to bear a low-birth-weight

Table B. Percent distribution of infants of low birth weight by period of gestation according to race: Total of 42 reporting States and the District of Columbia, 1976

Period of gestation	All races ¹	White	Black
Total ²	100.0	100.0	100.0
Under 37 weeks.....	54.6	54.0	56.3
37 weeks and over.....	45.4	46.0	43.7
Under 28 weeks.....	7.2	6.5	9.1
28-31 weeks.....	10.6	10.1	11.9
32-35 weeks.....	27.5	28.0	26.3
36 weeks.....	9.3	9.4	8.9
37-39 weeks.....	29.0	29.3	28.0
40 weeks.....	7.0	7.2	6.4
41-42 weeks.....	6.2	6.4	5.9
43 weeks and over.....	3.2	3.1	3.4

¹Includes races other than white and black.

²Excludes births for which period of gestation was not stated.

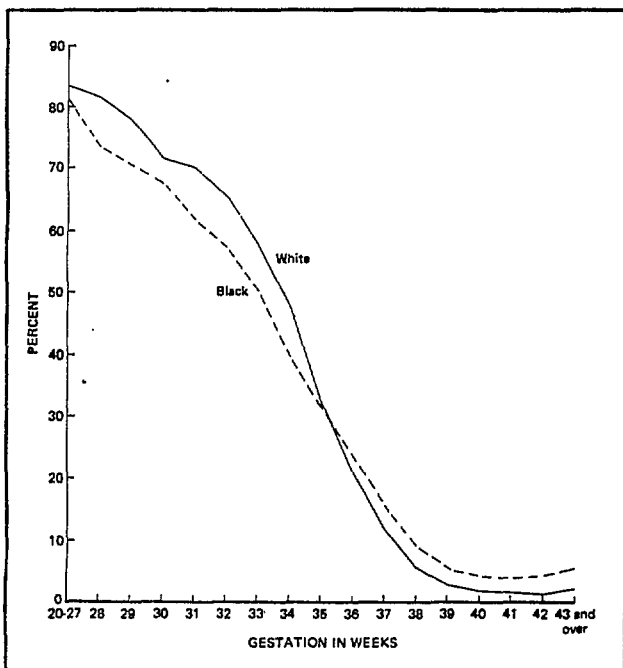


Figure 3. Percent of infants of low birth weight by period of gestation and race: Total of 42 reporting States and the District of Columbia, 1976

baby than were native-born mothers (table C). The most pronounced difference was for black and Chinese births, where the incidence of low birth weight was about 50 percent higher for native-born than for foreign-born mothers.

Table C. Percent of infants of low birth weight for native-born and foreign-born mothers, by race of child: United States, 1976

Race of child	Total ¹	Native-born mother ²	Foreign-born mother
All races.....	7.3	7.4	6.2
White.....	6.1	6.2	5.8
Black.....	13.0	13.2	8.8
American Indian.....	6.9	6.9	8.3
Chinese.....	5.7	7.7	5.2
Japanese.....	7.2	8.0	6.2
Other races.....	7.1	7.5	6.9

¹Includes unknown nativity.

²Born in the United States.

Among foreign-born white mothers, women born in Puerto Rico were far more likely than were women born in Cuba or Mexico to give birth to a low-birth-weight baby. The incidence of low birth weight for infants born to Puerto Rican-born mothers was 9.0 percent compared with the very low incidence of 5.2 percent for infants born to mothers born in Cuba and 5.4 percent for mothers born in Mexico (table D).

For almost all racial groups, higher levels of educational attainment of the mother were associated with a pronounced decrease in the proportion of low-birth-weight babies (table D). This was especially noticeable for white infants, where the incidence of low birth weight in 1976 was about 42 percent lower for births to women with 13 or more years of schooling than for births to women who had not completed high school. For black infants, the comparable difference in the incidence of low birth weight was 28 percent. The much lower incidence of low birth weight among black babies born to better educated mothers suggests that the generally lower birth weight of black babies is influenced to a great extent by environmental factors. (For a further discussion see "Period of Gestation.")

The variation in the incidence of low birth weight among infants born to mothers of different racial groups was slightly less for infants born to mothers with 12 years or more of education than it was for infants born to mothers with less than 12 years of education, an additional indication that racial differences in birth weight can be explained in part by socioeconomic factors.

Table D. Percent of infants of low birth weight by educational attainment and nativity of mother, and race of child: Total of 44 reporting States and the District of Columbia, 1976

Race of child and mother's nativity	Total	Years of school completed by mother		
		Less than 12 years	12 years	13 years or more
All races.....	7.4	10.1	6.8	5.5
White	6.2	8.4	5.8	4.9
Native-born ¹	6.2	8.6	5.8	4.8
Foreign-born:				
Puerto Rican.....	9.0	9.3	8.6	7.3
Cuban.....	5.2	6.7	4.5	4.5
Mexican.....	5.4	5.4	5.8	5.2
Other foreign-born.....	5.5	5.7	5.6	5.3
Not stated.....	12.2	9.8	6.5	6.1
Black.....	13.1	14.8	12.0	10.7
Native-born ¹	13.3	15.0	12.2	10.8
Foreign-born.....	9.1	8.4	9.2	9.3
Not stated.....	19.5	14.2	10.9	4.8
American Indian.....	6.8	7.3	6.6	5.9
Chinese.....	5.9	5.0	6.2	6.1
Japanese.....	7.5	7.3	7.8	7.1
Other races.....	7.2	8.5	7.0	6.5

¹Born in the United States.

Age of Mother and Birth Order

Both mother's age and the birth order of the child are independently related to birth weight, but the interaction of these two factors may strengthen or moderate their individual effects. The age of the mother and the birth order of the child are in turn strongly related to socioeconomic factors that have a bearing on weight at birth. The interrelationship of these factors as they affect the incidence of low birth weight is discussed in this section and in "Educational Attainment of Mothers" in "Social Factors."

Age of mother.—Very young mothers and mothers in the oldest years of childbearing were most apt to bear a low-birth-weight baby; mothers in their twenties and early thirties were least likely to (table E). The pattern of a much

Table E. Percent of infants of low birth weight by age of mother and race of child: United States, 1976

Age of mother	All races ¹	White	Black
All ages.....	7.3	6.1	13.0
Under 15 years.....	14.8	11.8	17.1
15-19 years.....	9.9	8.1	14.7
15 years.....	12.4	10.0	15.6
16 years.....	11.5	9.4	15.3
17 years.....	10.4	8.5	14.8
18 years.....	9.8	8.0	14.8
19 years.....	8.8	7.2	13.9
20-24 years.....	7.1	6.0	12.6
25-29 years.....	6.0	5.3	11.3
30-34 years.....	6.5	5.8	11.6
35-39 years.....	7.9	7.0	13.1
40-44 years.....	9.2	8.3	12.8
45-49 years.....	10.5	9.4	16.3

¹Includes races other than white and black.

higher incidence of low birth weight for infants born to very young mothers and older women is evident for both white and black infants. However, at all ages, black mothers are far more likely than are white mothers to bear a low-birth-weight baby (figure 4).

For both racial groups, the proportion of low-birth-weight babies generally increased progressively from the low observed for 25-29-year-old mothers as the age of mother increased or decreased. For white infants, the percent low birth weight varied from a low of 5.3 percent of those born to mothers 25-29 years to 11.8 percent of infants born to girls under 15 years of age and 9.4 percent of those born to women 45-49 years old. For black infants, the incidence of low birth weight ranged from 11.3 percent of those born to 25-29-year-old mothers to 17.1 percent of those born to girls under age 15 and 16.3 percent of infants born to 45-49-year-old mothers.

There has been increasing concern in recent years about the large number of births to teenage girls. Such births are more likely to be premature and of low birth weight than are births to mothers in their twenties. Not only are the infants of teenage mothers at greater risk,

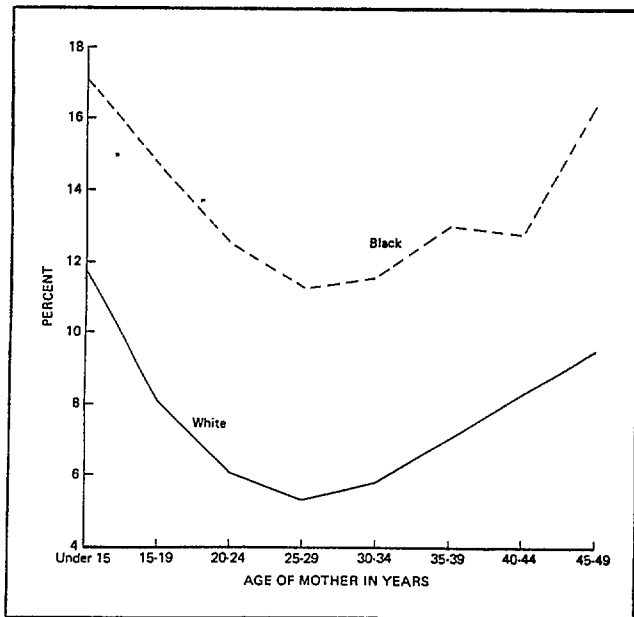


Figure 4. Percent of infants of low birth weight by age of mother and race of child: United States, 1976

but teenage mothers themselves are more likely to suffer from complications of pregnancy than are women in the optimum ages of childbearing.²⁰ A major biological problem of pregnancy for young teenagers is that the nutritional requirements of the growing infant are superimposed on their own elevated needs during the adolescent growth spurt. Yet, according to a recent survey, over half of all girls aged 15-17 years had less than the recommended intake of protein, vitamin A, and vitamin C, and over 90 percent had less than the recommended intake of iron.²¹

As shown in table E, girls under 15 years of age had the highest risk of any age group of bearing a low-birth-weight baby; the overall incidence for girls 15-19 years exceeded that for all older age groups except women 45-49 years old. The risk of low birth weight for infants born to teenage mothers diminished with each successive year of age—from 14.8 percent for infants born to girls under 15 years of age to 8.8 percent for those born to 19-year-olds.

For mothers old enough to have completed at least 12 years of education, increasing educational attainment was generally associated with a reduced risk of bearing a low-birth-weight baby (table F). Thus, for women aged 25-29 years, the most favored age group, the proportion of infants of low birth weight declined from a high of 9.2 percent of those born to mothers with 9-11 years of education to a low of 4.8 percent of infants born to women who had completed 16 years or more of education. For all age groups, the incidence of low birth weight increased slightly for infants born to mothers with 9-11 years of education compared to those born to mother with 0-8 years of education. A possible explanation for the lower risk of low birth weight among children born to women with minimal education is the fact that the incidence of fetal deaths is highest among women with the lowest educational attainment. Thus a greater proportion of pregnancies of women with low educational attainment may be terminating in fetal death rather than in a low-birth-weight live birth.

Age and birth order.—The pattern of a higher risk of low birth weight for infants born to very young girls and older women is seen for

Table F. Percent of infants of low birth weight by educational attainment of mother, age of mother, and race of child: Total of 44 reporting States and the District of Columbia, 1976

Age of mother and race	Total	Years of school completed by mother					
		0-8 years	9-11 years	12 years	13-15 years	16 years or more	Not stated
<u>All races¹</u>							
20-24 years	7.3	9.1	9.6	6.7	6.3	5.5	9.4
25-29 years	6.1	8.1	9.2	6.1	5.3	4.8	8.0
30-34 years	6.6	8.8	9.8	6.8	5.8	4.8	7.9
35-39 years	8.2	9.5	11.3	7.8	7.2	5.8	10.0
40-49 years	9.5	10.5	12.1	8.8	7.8	7.3	12.0
<u>White</u>							
20-24 years	6.1	8.1	7.9	5.7	5.3	4.8	7.4
25-29 years	5.3	7.1	7.8	5.4	4.8	4.5	6.4
30-34 years	5.8	7.7	8.6	6.1	5.2	4.4	6.6
35-39 years	7.1	8.4	10.0	6.9	6.5	5.2	8.1
40-49 years	8.6	9.8	11.6	8.0	7.1	6.7	9.7
<u>Black</u>							
20-24 years	12.8	14.2	14.4	12.1	11.4	10.2	15.4
25-29 years	11.5	13.3	13.5	11.0	10.5	8.8	15.9
30-34 years	11.7	13.4	13.2	11.2	10.6	9.5	14.7
35-39 years	13.3	13.1	14.4	12.8	12.5	11.5	17.5
40-49 years	13.0	13.4	12.9	12.8	10.7	10.4	19.6

¹Includes races other than white and black.

all birth orders (table G), an indication of the critical influence of mother's age. At each age, however, there are substantial differences in the incidence of low birth weight related to the birth order of the child (table G). For infants born to teenage mothers and mothers in their early twenties, the incidence rose sharply for fourth and higher order births. This probably reflects the close spacing of such births, a factor strongly related to an elevated risk of low birth weight. (See "Outcome of Last Pregnancy and Birth Interval".) In contrast, the proportion of low-birth-weight infants generally decreased for higher order births to women 35 years of age and over. The lowest incidence for any group was for women aged 25-29 years bearing their second child (5.1 percent); the highest was for teenagers 15-19 years of age having a fourth or higher order birth (20.3 percent) and girls under 15 years of age having a second child (30.5 percent). In general, the lowest risk of low birth weight occurred when the age of the mother and the birth order of the child were compatible—for example, when young mothers had first or

second births and older women had higher order births.

Plurality of Birth

There are increased health risks for both the mother and the infant when the birth is part of a plural delivery. According to a recent survey, twice as many infants in plural as in single deliveries had a 1-minute Apgar score of 7 or less²² (an indication of moderate or severe depression of the infant), 10 times as many were delivered in a breech position,²³ and 4 times as many mothers suffered one or more complications of labor.²⁰ Other studies indicate that perinatal and neonatal mortality is greatly elevated in twin pregnancies, that morbidity among surviving twins is high, and that these outcomes are more likely for the low-birth-weight twin.^{24,25} Information from the present study indicates that live births in plural deliveries are about 9 times as likely to be of low birth weight as single live births. The overall incidence of low birth weight in 1976 was 54.3 percent for

Table G. Percent of infants of low birth weight by age of mother, and live-birth order and race of child: United States, 1976

Live-birth order and race	Total	Age of mother							
		Under 15 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years
All races ¹	7.3	14.8	9.9	7.1	6.0	6.5	7.9	9.2	10.5
First child.....	7.6	14.3	9.1	6.7	6.4	7.9	10.3	11.7	15.2
Second child.....	6.5	30.5	12.0	6.6	5.1	5.7	7.9	9.4	9.3
Third child.....	7.1	*15.4	15.5	8.9	5.9	5.6	7.3	9.3	12.4
Fourth child and over.....	8.3	-	20.3	11.9	7.9	7.2	7.7	8.8	10.2
Not stated.....	9.1	16.4	11.4	8.3	7.3	8.5	10.2	13.8	-
White.....	6.1	11.8	8.1	6.0	5.3	5.8	7.0	8.3	9.4
First child.....	6.5	11.4	7.6	5.9	5.9	7.2	9.1	10.6	13.0
Second child.....	5.5	22.7	9.6	5.6	4.5	5.2	7.2	9.1	7.1
Third child.....	5.9	*33.3	12.6	7.5	5.2	5.1	6.4	8.8	13.8
Fourth child and over.....	6.9	-	17.3	9.5	6.6	6.2	6.7	7.9	9.0
Not stated.....	7.1	17.3	8.7	6.3	6.6	7.3	7.9	12.4	-
Black.....	13.0	17.1	14.7	12.6	11.3	11.6	13.1	12.8	16.3
First child.....	13.2	16.7	13.7	12.0	12.2	15.0	20.8	17.4	*40.0
Second child.....	12.8	34.9	17.0	12.1	10.2	10.6	13.3	12.6	21.7
Third child.....	12.6	*10.0	18.7	13.2	11.0	10.3	13.1	13.2	*5.9
Fourth child and over.....	13.0	-	22.5	15.5	12.3	11.7	12.1	12.5	15.7
Not stated.....	14.6	15.0	15.1	14.9	11.4	15.0	18.5	20.5	-

¹Includes races other than white and black.

infants in plural deliveries compared with 6.3 percent for infants in single deliveries (table H).

Period of gestation.—The higher incidence of low birth weight among infants in plural births is accounted for in part by their reduced gestational period.²⁶ In 1976 the median gestational period of infants born in plural deliveries (37.8 weeks) was 2½ weeks shorter than that of infants in single deliveries (40.3 weeks). However, at all periods of gestation there was a far greater risk of low birth weight for babies in plural deliveries, and at full term, infants in plural deliveries were, on the average, 11 times more likely to be of low birth weight than infants in single deliveries (table 3 and figure 5). The intrauterine volume of twins at 32½ weeks of gestation is close to that of a single infant at full term.²⁵ It has been suggested that the constricted intrauterine environment and diminished uterine bloodflow in women pregnant with more than one child limits full development and growth.²⁴

Age of mother.—For infants in both single and multiple deliveries, there is a much higher risk of low birth weight when the mother is a

teenager. The pattern of risk by age of mother for infants in single deliveries parallels that described for all infants in a previous section—that is, the incidence of low birth weight is lowest for infants born to mothers 25-29 years of age, with the incidence increasing as the age of the mother increases or decreases. For infants in plural deliveries, the percent of those of low birth weight generally declined as the age of the mother increased (table H).

Sex.—Female babies were more likely than male babies to be of low birth weight, regardless of whether the birth was single or part of a plural delivery (table J). In 1976 there was a 20 percent greater incidence of low birth weight among female infants (7.9 percent) than male infants (6.6 percent). About half (50.7 percent) of all male infants in twin deliveries were of low birth weight compared with 56.6 percent of all female infants in twin deliveries. The proportion of infants of low birth weight was extremely high for both male and female babies in triplet and other plural deliveries (85.7 percent and 92.2 percent for male and female births, respectively).

Table H. Percent of infants of low birth weight, by age of mother, plurality of birth, and race of child: United States, 1976

Plurality and race	Total	Age of mother							
		Under 15 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years	45-49 years
All races ¹	7.3	14.8	9.9	7.1	6.0	6.5	7.9	9.2	10.5
Single live births.....	6.3	14.1	9.2	6.2	5.0	5.5	6.8	8.3	10.1
Live births in plural deliveries.....	54.3	71.7	67.1	57.8	50.4	47.7	49.0	46.7	*66.7
White.....	6.1	11.8	8.1	6.0	5.3	5.8	7.0	8.3	9.4
Single live births.....	5.3	11.1	7.4	5.2	4.4	4.8	5.9	7.5	9.0
Live births in plural deliveries.....	51.8	73.1	63.4	55.3	49.0	46.0	46.7	45.4	*66.7
Black.....	13.0	17.1	14.7	12.6	11.3	11.6	13.1	12.8	16.3
Single live births.....	11.8	16.4	13.8	11.3	10.0	10.1	11.5	11.9	16.3
Live births in plural deliveries.....	64.1	69.5	74.0	66.8	58.6	54.8	57.2	50.0	-

¹Includes races other than white and black.

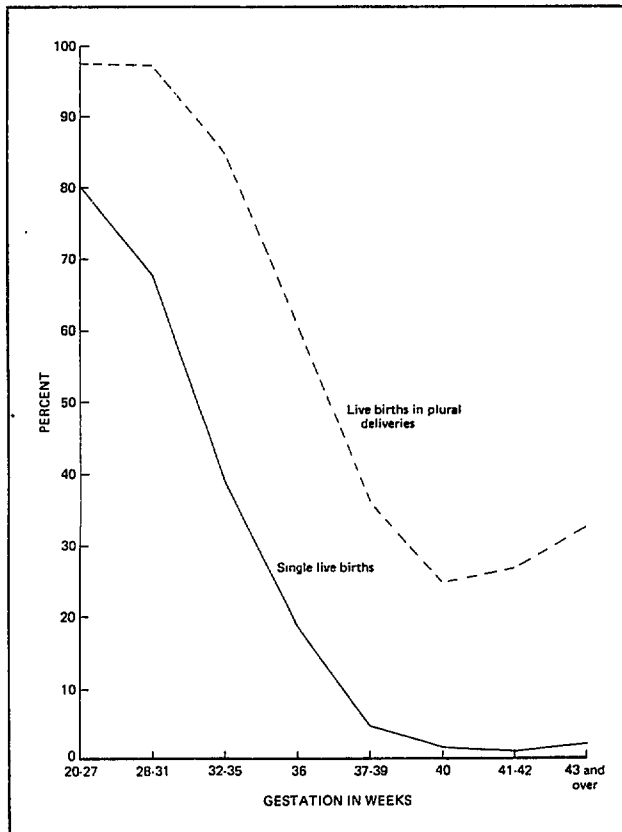


Figure 5. Percent of infants of low birth weight among single live births and among live births in plural deliveries by period of gestation: Total of 42 reporting States and the District of Columbia, 1976

Table J. Percent of infants of low birth weight by sex, plurality of birth, and race: United States, 1976

Plurality of birth and race	Total	Male	Female
All races ¹	7.3	6.6	7.9
Single live births.....	6.2	5.8	6.9
Live births in twin deliveries.....	53.7	50.7	56.6
Live births in other plural deliveries.....	89.1	85.7	92.2
White.....	6.1	5.6	6.6
Single live births.....	5.3	4.8	5.7
Live births in twin deliveries.....	51.1	48.3	53.9
Live births in other plural deliveries.....	88.6	85.9	91.3
Black.....	13.0	11.7	14.2
Single live births.....	11.8	10.6	12.9
Live births in twin deliveries.....	63.7	60.3	67.1
Live births in other plural deliveries.....	89.1	83.5	94.1

¹Includes races other than white and black.

SOCIAL FACTORS

Marital Status

There have been substantial increases in the number of infants born out of wedlock in recent years, concomitant with a gradual decline in

general fertility. This has resulted in a dramatic rise in the proportion of all births that are out of wedlock.²⁷ By 1976, 8 percent of all white babies and 50 percent of all black babies were born out of wedlock. Previous studies have documented the relatively greater health handicaps experienced by babies born out of wedlock.^{2,28} In this study, a higher risk of low birth weight was observed for out-of-wedlock infants, even when demographic and socioeconomic differences were taken into account.

Age of mother.—At all ages, unmarried mothers were more likely than married mothers to bear a low-birth-weight infant (table K). The overall proportion of out-of-wedlock babies of low birth weight (12.6 percent) was almost twice as high as that for other babies (6.4 percent), but this differential was reduced considerably when mothers were in their teens or aged 40 years and over.

Race.—For both black and white babies, the risk of low birth weight increased substantially for those born out of wedlock. For white infants born out-of-wedlock, the incidence of low birth weight in 1976 was 66 percent higher than for other infants (9.8 percent compared with 5.9 percent); for black babies it was 32 percent

higher (14.8 percent compared with 11.2 percent). Racial differences in the incidence of low birth weight were less pronounced among out-of-wedlock than among other infants. The proportion of infants of low birth weight was 51 percent higher among black than white out-of-wedlock infants (14.8 percent and 9.8 percent, respectively), but among infants born to married women, the proportion of those of low birth weight was 90 percent higher among black babies (11.2 percent and 5.9 percent, respectively).

Educational attainment.—For both out-of-wedlock and other infants, increasing educational attainment of the mother is associated with a substantial decline in the incidence of low birth weight. However, the decline is less pronounced among infants born out of wedlock (table L). The percent low birth weight declined from 13.6 percent to 9.9 percent as the educational attainment of unmarried mothers increased from 0-8 years to 16 years or more. The comparable decline in low birth weight among infants born to married mothers was from 8.7 percent to 4.8 percent. At higher levels of educational attainment there were still substantial differences in the incidence of low birth

Table K. Percent of infants of low birth weight by marital status and age of mother, and race of child: Total of 38 reporting States and the District of Columbia, 1976

Age of mother	Married mothers			Unmarried mothers		
	All races ¹	White	Black	All races ¹	White	Black
Total	6.4	5.9	11.2	12.6	9.8	14.8
Under 15 years.....	12.9	12.6	20.0	15.2	11.5	17.0
15-19 years.....	8.2	7.6	13.7	12.7	9.7	15.0
15 years.....	10.8	10.4	16.8	13.4	9.6	15.9
16 years.....	9.6	9.1	15.4	13.0	10.1	15.3
17 years.....	8.8	8.3	14.6	12.5	9.5	14.8
18 years.....	8.3	7.7	13.8	12.5	9.5	15.0
19 years.....	7.4	6.7	12.8	12.3	9.7	14.4
20-24 years.....	6.4	5.8	11.1	12.4	9.6	14.5
25-29 years.....	5.6	5.2	10.3	12.0	9.5	13.8
30-34 years.....	6.1	5.6	10.6	13.3	11.2	15.0
35-39 years.....	7.4	6.8	11.7	14.1	11.5	16.4
40-44 years.....	8.8	8.1	12.1	13.4	11.9	14.5
45-49 years.....	10.8	10.1	15.4	12.5	12.5	12.8

¹Includes races other than white and black.

Table L. Percent of infants of low birth weight by marital status and educational attainment of mother, and race of child: Total of 36 reporting States and the District of Columbia, 1976

Years of school completed by mother	Married mothers			Unmarried mothers		
	All races ¹	White	Black	All races ¹	White	Black
Total ²	6.4	5.8	11.1	12.7	9.8	14.8
0-8 years.....	8.7	8.2	13.0	13.6	10.8	16.4
9-11 years.....	8.6	7.9	12.7	13.2	10.3	15.4
12 years.....	6.1	5.5	10.7	11.7	9.0	13.6
13-15 years.....	5.4	5.0	10.0	11.7	9.2	13.3
16 years or more	4.8	4.4	9.0	9.9	7.5	12.0

¹Includes races other than white and black.
²Includes years of school not stated.

weight between out-of wedlock and other infants. Indeed, this differential generally increased with additional years of education for both major racial groups.

Area of residence.—As shown in table M, there are major differences in the incidence of low birth weight by marital status in both metropolitan and nonmetropolitan areas. In metropolitan areas, the proportion of low-birth-weight babies was more than twice as high for unmarried as for married mothers (13.0 percent compared with 6.4 percent); in non-metropolitan areas, this differential was reduced slightly to 87 percent (11.8 percent compared with 6.3

percent). The percent low birth weight among infants born out of wedlock was 10 percent higher for mothers residing in metropolitan areas compared with nonmetropolitan areas; among infants born to married mothers, the incidence of low birth weight was approximately the same in both areas.

Some of the differential in the incidence of low birth weight by marital status can be explained by differences in the age and educational attainment of the mother. If these factors are held constant, the differential in incidence is reduced by 9 percent among white infants and by 38 percent among black infants. It is apparent that there are additional determinants that maintain the wide differential by marital status within each racial group. It has been noted that the unmarried mother faces greater economic and emotional difficulties which may adversely affect the early development of her baby.²⁸ These factors may also be involved in the persistent elevation in the incidence of low birth weight among infants born out of wedlock.

Educational Attainment of Mother

Questions on the educational attainment of parents were added to the 1968 revision of the Standard Certificate of Live Birth to provide a measure of the socioeconomic status of the family. Since the educational attainment of the mother and father are highly correlated and the father's education is generally missing from birth certificates of infants born out of wedlock, the mother's education was chosen for analysis in this report.

Table M. Percent of infants of low birth weight by marital status and area of residence of mother and race of child: Total of 38 reporting States and the District of Columbia, 1976

Residence of mother and race of child	Married mothers	Unmarried mothers
All races ¹	6.4	12.6
Metropolitan areas	6.4	13.0
Nonmetropolitan areas.....	6.3	11.8
White	5.9	9.8
Metropolitan areas	5.8	9.7
Nonmetropolitan areas.....	5.9	9.8
Black	11.2	14.8
Metropolitan areas	11.3	15.1
Nonmetropolitan areas.....	11.0	14.0

¹Includes races other than white and black.

Table N shows that the proportion of low-birth-weight babies born to mothers with 16 years or more of education (4.9 percent) was half that of babies born to mothers with less than 9 years of education (9.9 percent). An inverse relationship between the incidence of low birth weight and educational attainment was found for each racial group, independent of age, nativity, marital status and residence of mother, and timing of prenatal care. (This is discussed in more detail in "Race and Mother's Nativity," "Age of Mother and Birth Order," "Marital Status," "Prenatal Care," and "Geographic Variations.")

Table N. Percent of infants of low birth weight by educational attainment of mother and race of child: Total of 44 reporting States and the District of Columbia, 1976

Years of school completed by mother	All races ¹	White	Black
Total.....	7.4	6.2	13.1
0-8 years.....	9.9	8.6	14.9
9-11 years.....	10.2	8.4	14.7
12 years.....	6.8	5.8	12.0
13-15 years.....	5.9	5.1	11.2
16 years or more.....	4.9	4.5	9.4
Not stated.....	9.5	7.4	16.0

¹Includes races other than white and black.

It has been noted that a number of factors associated with low socioeconomic status may be related to a less favorable outcome of pregnancy.²⁹ These include minimal education, low income, inadequate nutrition, maternal work and fatigue, and a history of deprivation in the mother's own childhood. The decreased risk of low birth weight associated with higher levels of education may thus be due to increased nutritional knowledge and the resources to apply this knowledge, a greater interest in health care, and a higher level of prepregnancy health.

PREGNANCY HISTORY

Prenatal Care

The early initiation of prenatal care is generally regarded as crucial for the identification and correction of any existing medical and obstetrical problems. It is difficult to ascertain whether

prenatal care has an effect on birth weight since mothers who seek early and continuous care are also likely to be in the most favored socioeconomic groups. The prevalence of low birth weight has been related to the source of prenatal care (private versus public services),¹⁹ the poverty status of the area of residence,³⁰ and as discussed in the section "Educational Attainment of Mother," to years of schooling. In this study, the mother's educational attainment is used as an indication of her socioeconomic status and is, therefore, taken into account in analyzing the association between the incidence of low birth weight and the time of initiation of prenatal care.

Age of mother.—The proportion of low-birth-weight babies was lower when prenatal care was initiated early by white mothers of all ages, but the pattern was less clear for black infants (table O). For each age group, a substantial part of the difference can be explained by the higher educational attainment of mothers who started prenatal care early in the pregnancy. After adjustment for variations in years of education, there was only a 10-percent elevation in the incidence of low birth weight among children of white mothers (all ages combined) who started care in the last trimester rather than in the first 2 months of pregnancy. Before adjustment, this difference was 27 percent. For black infants, adjustment resulted in an incidence of low birth weight 3 percent *lower* when care started late rather than early. Before adjustment the proportion was 3 percent higher for late care.

As shown in table 4, as years of education increased for all age groups of mothers except teenagers (many of whom had not had the opportunity to complete their education), the incidence of low birth weight generally decreased, regardless of when prenatal care began. The proportion of infants of low birth weight born to white mothers declined from 8.6 percent for mothers with 0-8 years of education to 4.5 percent for mothers who had completed 16 or more years of education. For black infants the comparable decline was from 14.8 percent to 9.5 percent. However, for each age group and at all educational levels, the percent low birth weight was far higher when mothers had no prenatal care than when some care was received.

Table O. Observed and adjusted percent of infants of low birth weight by age of mother, month of pregnancy prenatal care began, and race of child: Total of 41 reporting States and the District of Columbia, 1976

Month of pregnancy prenatal care began and race	Total		Age of mother							
			Under 20 years		20-29 years		30-39 years		40 years and over	
	Observed	Adjusted ¹	Observed	Adjusted ¹	Observed	Adjusted ¹	Observed	Adjusted ¹	Observed	Adjusted ¹
All races ²	7.4	7.4	10.3	10.3	6.7	6.7	7.0	7.0	9.5	9.5
1st and 2d month	6.4	6.7	9.0	9.2	6.0	6.2	6.3	6.5	8.4	8.8
3d month.....	6.9	7.0	9.7	9.9	6.3	6.3	6.5	6.5	8.7	8.9
4th-6th month	8.7	8.1	10.1	10.1	7.9	7.6	8.1	7.5	10.2	10.0
7th-9th month	8.6	7.9	9.7	9.5	7.9	7.3	8.3	7.7	10.5	9.5
No prenatal care	23.0	22.2	27.2	26.9	20.5	20.5	21.8	22.1	19.0	19.4
White	6.2	6.2	8.2	8.2	5.7	5.7	6.1	6.1	8.5	8.5
1st and 2d month	5.6	5.8	7.2	7.4	5.3	5.5	5.7	5.9	7.2	7.4
3d month.....	5.9	5.9	7.8	7.9	5.4	5.5	5.7	5.7	8.1	8.3
4th-6th month	7.1	6.6	8.2	8.1	6.5	6.2	7.0	6.5	9.8	9.5
7th-9th month	7.1	6.4	7.8	7.6	6.7	6.0	7.1	6.5	9.3	8.7
No prenatal care	19.2	18.1	24.3	24.0	16.4	16.1	18.0	17.5	15.5	16.2
Black.....	13.1	13.1	14.9	14.9	12.3	12.3	12.1	12.1	13.1	13.1
1st and 2d month	11.9	12.3	14.3	14.4	11.4	11.7	10.6	10.8	13.5	13.4
3d month.....	12.6	12.7	14.8	14.8	11.7	11.8	11.8	11.8	11.0	11.0
4th-6th month	12.8	12.6	13.8	13.8	12.2	12.0	12.2	11.9	12.1	12.6
7th-9th month	12.2	11.9	13.2	13.1	11.4	11.1	11.6	11.5	13.8	12.8
No prenatal care	28.6	28.5	31.2	31.0	26.7	26.9	28.4	29.5	28.0	25.8

¹ Adjusted for differences in mother's educational attainment.

² Includes races other than white and black.

This persistent elevation can be explained in part by the fact that the "no care" category is heavily weighted with premature births, where the mother delivered before having the opportunity to receive care.^{1 3}

Marital status.—The incidence of low birth weight among infants born to married mothers increased with each delay in starting prenatal care (table P). For white married mothers, the proportion of infants of low birth weight was 5.4 percent when care started in the first 2 months of pregnancy and 6.8 percent when care was delayed to the last 3 months. For black married mothers, the comparable increase was from 10.5 percent to 11.3 percent. However, the risk of low birth weight declined for both white and black infants born out of wedlock when care was delayed. As noted in a previous report,^{1 3} this is partly due to the large numbers of unmarried mothers who started care early but delivered prematurely.

Regardless of when prenatal care began, there was a higher risk of low birth weight among out-of-wedlock than among other infants. When care began in the first 2 months of pregnancy, the incidence of low birth weight was more than two-thirds greater among white

out-of-wedlock infants (9.1 percent) than other white infants (5.4 percent) and more than one-third higher among black out-of-wedlock infants (14.2 percent) than other infants (10.5 percent). The differentials by marital status were greatly reduced when care was delayed until the second or third trimester of pregnancy.

Outcome of Last Pregnancy and Birth Interval

Both the outcome of the previous pregnancy and the interval since the termination of the previous pregnancy are closely related to the survival and birth weight of the current birth. In a continuing study of approximately 59,000 pregnancies, it was found that if the mother's last pregnancy had terminated in a fetal or neonatal death, her present infant had a greatly increased risk of stillbirth, neonatal death, or low birth weight.^{3 1} Those infants conceived within 3 months and born within 1 year of a previous full-term pregnancy had lower birth weights on the average than a matched group of infants born within 2-5 years of a previous full-term pregnancy.^{3 2}

As shown in table Q, there was a higher incidence of low birth weight among both white

Table P. Percent of infants of low birth weight by month of pregnancy prenatal care began, marital status of mother, and race of child: Total of 34 reporting States and the District of Columbia, 1976

Marital status and race	Total	Month of pregnancy prenatal care began					
		1st and 2d month	3d month	4th-6th month	7th-9th month	No prenatal care	Not stated
All races ¹	7.3	6.3	6.8	8.5	8.5	20.7	10.2
Births to married mothers	6.4	5.8	6.1	7.3	7.5	16.8	8.8
Births to unmarried mothers	12.6	12.1	12.3	11.9	10.2	25.5	15.7
White	6.1	5.5	5.8	6.9	7.1	16.8	8.6
Births to married mothers	5.8	5.4	5.6	6.6	6.8	14.9	8.1
Births to unmarried mothers	9.7	9.1	9.2	9.1	8.0	20.8	13.6
Black	13.0	11.9	12.6	12.9	12.4	29.2	15.3
Births to married mothers	11.2	10.5	10.9	11.3	11.3	26.0	13.3
Births to unmarried mothers	14.7	14.2	14.4	13.9	13.0	30.7	17.0

¹Includes races other than white and black.

Table Q. Percent of single-live-birth infants of low birth weight by outcome of last pregnancy, interval since termination of last pregnancy, and race of child: Total of 43 reporting States and the District of Columbia, 1976

Interval since termination of last pregnancy and race	Total	Last pregnancy live birth	Last pregnancy fetal death	Last pregnancy outcome unknown
All races ^{1,2}	5.9	5.4	8.5	8.6
Less than 12 months	14.9	17.8	11.7	27.3
12-23 months	6.2	6.1	6.9	8.4
24-35 months	4.7	4.4	8.0	6.1
36-47 months	4.6	4.4	8.2	9.2
48 months and over	5.3	5.2	9.0	7.8
Not stated	8.2	6.6	10.5	8.6
White ²	4.8	4.4	7.1	6.8
Less than 12 months	12.1	14.5	9.8	*35.3
12-23 months	5.0	4.8	5.8	8.2
24-35 months	3.9	3.7	6.8	5.7
36-47 months	3.8	3.6	7.2	9.6
48 months and over	4.5	4.3	7.5	7.9
Not stated	6.5	5.1	8.8	6.8
Black ²	11.5	10.6	15.7	14.1
Less than 12 months	25.6	26.5	23.8	-
12-23 months	12.1	11.8	13.9	8.6
24-35 months	9.8	9.3	14.2	*11.8
36-47 months	9.5	9.2	13.6	-
48 months and over	9.3	9.1	16.2	8.3
Not stated	14.0	12.6	16.4	14.1

¹Includes races other than white and black.

²Includes all single live births resulting from second and higher order pregnancies.

and black infants in single deliveries when the last pregnancy resulted in a fetal death rather than a live birth.^c For all races combined, the proportion of infants of low birth weight among current births was 8.5 percent when the last pregnancy was a fetal death and 5.4 percent when the last delivery was a live birth (an increase in risk of 57 percent).

Mothers were least likely to bear a low-birth-weight baby when the interval between births was 2-4 years. The incidence of low birth weight for this interval was between 4.6 percent and 4.7 percent. Both shorter and longer intervals were associated with an increase in the proportion of low-birth-weight babies. When the current birth was within a year of the previous delivery, the proportion of infants of low birth

weight increased to 14.9 percent, more than 3 times the proportion of low-birth-weight infants for intervals of 2-4 years.

The age of the mother and the interval between births were related. For example, in 1976, 23 percent of the mothers delivering within 1 year of a previous live birth were less than 20 years of age; only 3 percent were 35 years or more. As noted in "Age of Mother," the incidence of low birth weight varied with the mother's age. However, within each age group there was a large variation in the proportion of low-birth-weight babies according to the length of the interval between births (table R). The same pattern of a higher incidence of low birth weight for very short and very long intervals and an optimum interval of between 2 and 4 years is evident for each age group.

The distribution of low-birth-weight and heavier babies by interval since termination of

^cThe analysis of the risk of low birth weight in this section is based on data that exclude multiple births.

Table R. Percent of single-live-birth infants of low birth weight, by age of mother, interval since last live birth, and race of child: Total of 43 reporting States and the District of Columbia, 1976

Interval since last live birth and race	Total	Age of mother					
		Under 20 years	20-24 years	25-29 years	30-34 years	35-39 years	40 years and over
All races ^{1,2}	5.7	10.7	6.1	4.6	5.0	6.4	8.0
Less than 12 months.....	18.2	25.6	17.5	14.2	13.1	14.8	22.5
12-23 months.....	6.3	10.2	6.4	4.7	5.1	5.7	6.8
24-35 months.....	4.7	8.3	5.1	3.8	3.8	5.2	6.5
36-47 months.....	4.6	8.6	5.3	3.8	4.2	5.2	6.2
48 months and over.....	5.6	9.3	6.1	5.0	5.3	6.8	8.4
Not stated.....	7.2	13.4	7.9	5.7	6.4	8.1	8.4
White ²	4.6	8.1	4.8	3.9	4.4	5.6	7.2
Less than 12 months.....	14.8	20.6	14.7	11.8	11.5	12.5	16.7
12-23 months.....	5.0	7.9	5.2	3.9	4.4	5.0	4.9
24-35 months.....	3.9	6.2	4.1	3.4	3.3	4.7	6.2
36-47 months.....	3.8	6.1	4.2	3.3	3.7	4.4	5.6
48 months and over.....	4.7	6.5	4.7	4.2	4.7	5.9	7.8
Not stated.....	5.6	9.1	6.2	4.5	5.4	7.2	5.1
Black ²	11.0	15.3	11.2	9.5	9.4	10.8	11.8
Less than 12 months.....	26.9	33.6	24.3	24.3	18.8	22.8	38.7
12-23 months.....	12.1	14.8	11.7	10.0	9.8	9.6	12.9
24-35 months.....	9.9	12.2	10.1	8.4	8.2	8.1	8.5
36-47 months.....	9.7	12.3	10.0	8.7	8.6	10.2	9.0
48 months and over.....	9.8	12.1	10.5	9.1	9.3	11.3	11.3
Not stated.....	13.1	19.8	12.9	11.6	11.1	10.9	17.9

¹Includes races other than white and black.

²Includes all single live births resulting from second and higher order pregnancies.

last pregnancy is shown in table S. There was a higher concentration of low-birth-weight babies at the shorter interbirth intervals—39.1 percent of all low-birth-weight babies were born within 2 years of the termination of the previous pregnancy, compared with 30.2 percent of the higher weight babies. Nearly 3 times the proportion of low-birth-weight than other babies were born within a year of the previous delivery (8.3 percent compared with 2.8 percent). Similar differences were found for each race. The mean interval between births was ½ month shorter for white infants of low birth weight than white heavier babies and 4 months shorter for black infants of low birth weight than other black babies.

The study of closely spaced pregnancies cited earlier^{3,2} concluded that the depression in

birth weight associated with these pregnancies could not be attributed to social class differences or prematurity, since these factors had been controlled. Rather, it appeared probable that fetal growth was stunted because the mother had insufficient time between pregnancies to restore supplies of nutrients critical for optimum fetal body development.

GEOGRAPHIC VARIATIONS

There are relatively large differences in the incidence of low birth weight according to mother's place of residence. As shown in table 5, the proportion of low-birth-weight babies was highest in the South Region (8.0 percent) and lowest in the West Region (6.4 percent). However, part of the overall difference among regions was due to variations in the proportion of black infants born in each region. For example, 25 percent of the infants born in the South Region were black, but only 7 percent of those born in the West Region were black.

Considering each racial group separately, there was still considerable variation by geographic area in the incidence of low birth weight. Among States, the lowest incidence for white infants was in North Dakota (4.9 percent) and the highest was in Colorado and Wyoming (8.5 percent). The proportion of low-birth-weight black infants ranged from 1.7 percent in Idaho to 17.2 percent in Wyoming. However, in both States, there were fewer than 100 black infants born during 1976. If States with less than 100 black births are excluded from the comparison, there is approximately the same degree of variation in the incidence of low birth weight among States for each racial group. The coefficient of variation of the percent low birth weight among States was 11.1 percent for white infants and 9.6 percent for black infants.

Within States, the incidence of low birth weight for infants of races other than white or black was generally higher than that for white infants but substantially lower than that for black infants (table 5). However, when interpreting these data, it should be borne in mind that the category "other races" includes a wide diversity of racial and ethnic groups (see appendix II) with varying representation from State to State.

Table S. Percent distribution of single live births by interval since termination of last pregnancy, according to race of child and birth weight: Total of 43 reporting States and the District of Columbia, 1976

Interval since termination of last pregnancy and race	Total	Birth weight	
		2,500 grams or less	2,501 grams or more
All races ¹	100.0	100.0	100.0
Less than 12 months.....	3.1	8.3	2.8
12-23 months.....	27.6	30.8	27.4
24-35 months.....	23.0	19.3	23.2
36-47 months.....	15.6	12.7	15.8
48 months and over	30.7	29.0	30.8
Mean interval in months ²	41.8	40.6	41.9
White.....	100.0	100.0	100.0
Less than 12 months.....	2.9	7.7	2.7
12-23 months.....	27.1	29.7	26.9
24-35 months.....	23.7	20.1	23.8
36-47 months.....	16.0	13.0	16.1
48 months and over	30.4	29.5	30.4
Mean interval in months ²	41.7	41.2	41.7
Black.....	100.0	100.0	100.0
Less than 12 months.....	4.0	9.4	3.4
12-23 months.....	29.8	33.0	29.4
24-35 months.....	19.6	17.5	19.9
36-47 months.....	13.8	11.9	14.0
48 months and over	32.8	28.1	33.4
Mean interval in months ²	42.8	39.3	43.3

¹Includes races other than white and black.

²Includes all single live births resulting from second and higher order pregnancies.

Two factors known to be associated with a high incidence of low birth weight are low educational attainment and teenage motherhood. However, variations from State to State in the proportion of mothers who had less than 12 years of education or who were teenagers accounted for only 13 percent of the total variation in the proportion of low-birth-weight white babies and 10 percent of the total variation among black babies.

Both white and black mothers living in large urban places were more likely than mothers residing in very small urban places to bear a low-birth-weight baby (table T). The incidence of low birth weight decreased progressively as size of place decreased, from 7.2 percent for

infants born to white mothers residing in cities of 1,000,000 or more population to 6.2 percent for infants born to white mothers residing in cities of 10,000 to 50,000 population. The comparable decrease in incidence for infants born to black mothers was from 14.1 percent to 12.8 percent. An even lower incidence was seen for infants born to mothers living in the remaining, primarily rural, areas (5.9 percent and 12.1 percent for white and black infants, respectively). The decline in the incidence of low birth weight with decreasing size of place can be observed at each level of educational attainment, an indication that factors other than years of education are responsible for these differences.

Table T. Percent of infants of low birth weight by educational attainment of mother, size of place of residence, and race of child: Total of 44 reporting States and the District of Columbia, 1976

Size of place of residence and race	Total	Years of school completed by mother		
		Less than 12 years	12 years	13 years or more
All races ¹	7.4	10.1	6.8	5.5
Urban places	8.3	11.1	7.7	6.0
1,000,000 or more population	10.2	12.1	9.5	8.0
500,000-1,000,000 population	9.6	11.8	8.8	7.1
100,000-500,000 population	8.6	11.4	7.9	6.3
50,000-100,000 population	7.4	10.4	7.0	5.5
10,000-50,000 population	7.0	10.1	6.6	5.2
Balance of area.....	6.6	9.1	6.0	5.0
White.....	6.2	8.4	5.8	4.9
Urban places	6.5	8.8	6.1	5.0
1,000,000 or more population	7.2	8.5	6.8	5.9
500,000-1,000,000 population	6.9	8.7	6.4	5.5
100,000-500,000 population	6.6	9.0	6.1	5.1
50,000-100,000 population	6.3	8.7	6.0	5.0
10,000-50,000 population	6.2	8.9	5.9	4.8
Balance of area.....	5.9	8.1	5.6	4.7
Black.....	13.1	14.8	12.0	10.7
Urban places	13.5	15.2	12.4	11.0
1,000,000 or more population	14.1	15.9	13.0	11.5
500,000-1,000,000 population	13.5	14.9	12.2	11.2
100,000-500,000 population	13.3	15.2	12.1	11.1
50,000-100,000 population	13.4	15.5	12.5	10.3
10,000-50,000 population	12.8	14.4	11.8	10.5
Balance of area.....	12.1	13.6	11.1	9.5

¹Includes races other than white and black.

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Table 1. Percent of infants of low birth weight by race: United States, 1950-76

Year	All races	White	All other races	
			Total	Black
1976.....	7.3	6.1	12.1	13.0
1975.....	7.4	6.3	12.2	13.1
1974.....	7.4	6.3	12.4	13.1
1973.....	7.6	6.4	12.5	13.3
1972.....	7.7	6.5	12.9	13.6
1971.....	7.7	6.6	12.7	13.4
1970.....	7.9	6.8	13.3	13.9
1969.....	8.1	7.0	13.5	14.1
1968.....	8.2	7.1	13.7	---
1967.....	8.2	7.1	13.6	---
1966.....	8.3	7.2	13.9	---
1965.....	8.3	7.2	13.8	---
1964.....	8.2	7.1	13.9	---
1963 ¹	8.2	7.1	13.6	---
1962 ¹	8.0	7.0	13.1	---
1961.....	7.8	6.9	13.0	---
1960.....	7.7	6.8	12.8	---
1959.....	7.7	6.8	12.9	---
1958 ²	7.7	6.8	12.9	---
1957 ²	7.6	6.8	12.4	---
1956 ²	7.5	6.7	12.0	---
1955 ^{2,3}	7.6	6.8	11.7	---
1954 ^{2,3}	7.4	6.8	11.3	---
1953 ^{2,3}	7.6	7.0	11.3	---
1952 ^{2,3}	7.6	7.0	11.1	---
1951 ^{2,3}	7.5	7.0	10.7	---
1950 ^{2,3}	7.5	7.1	10.2	---

¹Figures by color exclude data for residents of New Jersey.

²Excludes data for Massachusetts.

³Excludes data for Connecticut.

Table 2. Percent of infants of low birth weight by period of gestation and race: Total of 42 reporting States and the District of Columbia, 1976

Period of gestation	All races ¹	White	Black
Total.....	7.3	6.1	12.9
Under 20 weeks.....	56.8	50.7	65.7
20 weeks.....	77.1	75.3	78.9
21 weeks.....	80.5	79.0	82.3
22 weeks.....	86.7	84.4	90.2
23 weeks.....	85.6	85.6	85.6
24 weeks.....	84.7	84.9	84.0
25 weeks.....	85.0	85.3	84.4
26 weeks.....	80.5	83.7	75.5
27 weeks.....	80.5	82.4	76.9
28 weeks.....	78.5	81.4	73.5
29 weeks.....	75.5	78.1	70.8
30 weeks.....	69.6	71.4	67.4
31 weeks.....	67.0	70.1	61.8
32 weeks.....	63.0	65.8	57.6
33 weeks.....	55.5	58.3	50.5
34 weeks.....	45.0	47.5	39.9
35 weeks.....	32.2	32.6	31.5
36 weeks.....	21.7	21.0	23.8
37 weeks.....	12.7	12.0	15.6
38 weeks.....	6.4	5.8	9.2
39 weeks.....	3.3	2.9	5.6
40 weeks.....	2.1	1.8	4.1
41 weeks.....	1.7	1.4	3.9
42 weeks.....	1.6	1.3	4.1
43 weeks.....	2.1	1.7	5.0
44 weeks.....	2.5	2.1	4.9
45 weeks.....	2.4	1.9	4.8
46 weeks.....	2.6	2.1	5.6
47 weeks.....	3.1	2.7	5.6
48 weeks.....	3.0	2.6	4.7
49 weeks.....	3.5	2.7	8.8
50 weeks and over.....	4.4	3.5	9.0
Not stated.....	9.2	7.5	15.1

¹Includes races other than white and black.

Table 3. Percent of infants of low birth weight by period of gestation, plurality of birth, and race: Total of 42 reporting States and the District of Columbia, 1976

Plurality and race	Total ¹	Period of gestation								
		20-27 weeks	28-31 weeks	32-35 weeks	36 weeks	37-39 weeks	40 weeks	41-42 weeks	43 weeks and over	Not stated
All races ²	7.3	82.6	71.3	43.3	21.7	5.6	2.1	1.7	2.4	9.2
Single live births.....	6.3	80.2	67.7	39.2	18.9	4.9	1.9	1.5	2.2	8.2
Live births in plural deliveries.....	54.2	97.8	97.7	84.7	61.7	36.5	25.1	26.9	32.6	59.8
White	6.1	83.5	73.9	44.7	21.0	5.0	1.8	1.4	2.0	7.5
Single live births.....	5.2	80.7	70.1	40.1	18.1	4.3	1.6	1.2	1.8	6.6
Live births in plural deliveries.....	51.6	98.2	98.8	84.6	60.1	34.2	22.7	24.3	30.7	58.6
Black	12.9	81.2	67.1	40.8	23.8	8.6	4.1	4.0	5.2	15.1
Single live births.....	11.7	79.3	64.1	37.7	21.5	7.8	3.7	3.6	4.8	13.8
Live births in plural deliveries.....	64.0	98.1	95.1	85.3	66.4	45.6	37.4	39.6	39.4	68.7

¹Includes live births of less than 20 weeks' gestation.

²Includes races other than white and black.

Table 4. Percent of infants of low birth weight by educational attainment of mother, age of mother, month of pregnancy prenatal care began, and race of child: Total of 41 reporting States and the District of Columbia, 1976

Age of mother, month of pregnancy prenatal care began and race	Total	Years of school completed by mother					
		0-8 years	9-11 years	12 years	13-15 years	16 years or more	Not stated
All races¹							
All ages.....	7.4	9.9	10.2	6.8	5.9	4.9	9.9
1st-2d month.....	6.4	8.6	9.2	6.1	5.5	4.9	7.9
3d month.....	6.9	9.7	9.5	6.5	5.6	4.5	9.3
4th-6th month.....	8.7	9.7	10.4	7.8	6.9	5.4	10.9
7th-9th month.....	8.6	9.3	9.8	7.6	7.0	5.3	9.8
No prenatal care.....	23.0	22.0	24.2	21.9	20.6	21.1	27.9
Not stated.....	10.6	12.8	13.6	9.4	9.7	7.0	10.0
Under 20 years.....	10.3	12.4	10.9	8.5	8.9	14.4	13.2
1st-2d month.....	9.0	10.7	10.0	7.5	7.4	7.1	10.3
3d month.....	9.7	11.9	10.4	8.1	9.7	10.7	13.0
4th-6th month.....	10.1	11.7	10.6	8.6	8.9	19.4	11.4
7th-9th month.....	9.7	11.3	9.9	8.4	8.2	*37.5	10.2
No prenatal care.....	27.2	28.8	27.0	26.5	20.1	-	32.0
Not stated.....	14.1	16.8	14.7	11.9	13.5	-	14.2
20-29 years.....	6.7	8.6	9.4	6.4	5.8	4.9	9.1
1st-2d month.....	6.0	7.7	8.5	5.9	5.4	4.9	8.0
3d month.....	6.3	8.7	8.7	6.1	5.4	4.5	8.5
4th-6th month.....	7.9	8.3	10.0	7.5	6.8	5.3	11.0
7th-9th month.....	7.9	8.0	9.5	7.4	6.6	4.9	9.2
No prenatal care.....	20.5	19.5	21.0	19.9	20.8	21.4	24.9
Not stated.....	9.5	10.3	12.6	9.0	9.6	7.0	8.7
30-39 years.....	7.0	9.0	10.3	7.0	6.1	5.0	8.8
1st-2d month.....	6.3	8.0	9.5	6.5	5.8	5.0	6.4
3d month.....	6.5	8.7	9.3	6.8	5.6	4.5	8.3
4th-6th month.....	8.1	9.2	10.9	7.8	6.6	5.4	9.1
7th-9th month.....	8.3	7.9	10.6	7.3	8.2	6.1	11.0
No prenatal care.....	21.8	17.6	23.4	23.1	20.9	21.5	27.9
Not stated.....	9.7	12.2	13.6	9.1	9.4	6.8	9.7
40 years and over.....	9.5	10.3	12.0	8.8	8.2	6.7	12.8
1st-2d month.....	8.4	10.2	12.5	7.1	8.3	6.5	8.5
3d month.....	8.7	10.3	11.3	7.8	8.3	6.3	10.0
4th-6th month.....	10.2	9.9	11.1	10.9	6.6	6.9	17.4
7th-9th month.....	10.5	10.7	12.7	10.8	8.4	-	7.4
No prenatal care.....	19.0	12.6	21.3	23.5	14.3	*13.3	38.1
Not stated.....	12.2	11.5	13.5	11.1	12.9	14.6	11.8
White							
All ages.....	6.2	8.6	8.4	5.8	5.1	4.5	7.7
1st-2d month.....	5.6	7.7	7.8	5.4	4.9	4.6	6.8
3d month.....	5.9	8.6	7.9	5.6	4.9	4.0	7.1
4th-6th month.....	7.1	8.2	8.6	6.4	5.7	4.8	8.5
7th-9th month.....	7.1	8.3	8.1	6.3	5.6	4.1	7.9
No prenatal care.....	19.2	19.2	20.8	18.0	14.7	17.8	20.9
Not stated.....	8.7	10.7	11.4	7.8	8.5	6.6	7.9

See footnote at end of table.

Table 4. Percent of infants of low birth weight by educational attainment of mother, age of mother, month of pregnancy prenatal care began, and race of child: Total of 41 reporting States and the District of Columbia, 1976—Con.

Age of mother, month of pregnancy prenatal care began and race	Total	Years of school completed by mother					
		0-8 years	9-11 years	12 years	13-15 years	16 years or more	Not stated
White—Con.							
Under 20 years	2.2	10.6	8.7	6.7	6.6	13.2	10.6
1st-2d month	7.2	9.3	8.0	6.0	5.5	10.5	9.3
3d month.....	7.8	10.6	8.3	6.6	6.7	9.5	10.0
4th-6th month.....	8.2	9.8	8.6	6.8	6.6	15.0	9.1
7th-9th month.....	7.8	10.0	7.8	6.7	6.8	*33.3	7.5
No prenatal care	24.3	26.1	24.1	23.3	18.8	-	27.7
Not stated.....	11.9	12.7	12.6	10.7	9.4	-	11.5
20-29 years	5.7	7.6	7.9	5.5	5.0	4.5	7.2
1st-2d month	5.3	7.1	7.4	5.3	4.8	4.6	6.8
3d month.....	5.4	7.7	7.4	5.4	4.8	4.0	6.7
4th-6th month.....	6.5	7.2	8.4	6.2	5.5	4.8	8.0
7th-9th month.....	6.7	7.4	8.2	6.1	5.3	3.6	7.9
No prenatal care	16.4	16.2	17.0	16.3	13.7	18.0	17.7
Not stated.....	7.8	8.9	10.3	7.3	8.4	6.8	7.1
30-39 years	6.1	8.0	9.2	6.3	5.5	4.6	7.1
1st-2d month	5.7	7.3	8.8	6.1	5.3	4.6	5.6
3d month.....	5.7	7.7	8.4	6.0	5.2	4.0	6.8
4th-6th month.....	7.0	7.6	9.5	6.8	6.1	4.8	8.5
7th-9th month.....	7.1	7.4	8.9	6.5	6.4	5.2	9.1
No prenatal care	18.0	16.2	21.1	17.4	15.2	17.9	21.1
Not stated.....	8.2	11.6	11.4	7.9	8.5	5.9	7.7
40 years and over	8.5	9.7	11.3	8.0	7.5	6.2	10.1
1st-2d month	7.2	7.9	9.8	6.6	7.1	6.0	10.9
3d month.....	8.1	10.7	11.1	6.8	8.4	6.1	8.8
4th-6th month.....	9.8	9.9	11.7	10.3	6.5	5.5	14.7
7th-9th month.....	9.3	7.2	14.0	10.8	7.0	-	*5.6
No prenatal care	15.5	14.0	15.1	18.0	*20.0	*14.3	-
Not stated.....	11.3	12.3	13.6	9.4	9.6	16.7	8.6
Black							
All ages.....	13.1	14.8	14.7	12.0	11.3	9.5	16.2
1st-2d month	11.9	13.1	14.1	11.3	10.9	8.8	14.0
3d month.....	12.6	14.3	14.1	11.7	10.8	10.4	15.5
4th-6th month.....	12.8	14.2	13.9	11.9	11.0	9.1	15.3
7th-9th month.....	12.2	13.0	13.4	10.8	10.2	11.1	13.1
No prenatal care	28.6	31.4	28.7	26.7	28.6	32.3	36.1
Not stated.....	15.8	19.8	17.7	14.0	14.2	10.2	16.4
Under 20 years	14.9	16.8	15.4	13.2	12.5	20.0	16.9
1st-2d month	14.3	15.3	15.1	13.1	11.2	-	12.7
3d month.....	14.8	15.6	15.4	13.1	15.1	*20.0	16.5
4th-6th month.....	13.8	15.8	14.2	12.5	11.3	*30.0	14.3
7th-9th month.....	13.2	13.9	13.8	11.6	10.0	*50.0	13.8
No prenatal care	31.2	35.1	30.9	30.3	22.1	-	35.5
Not stated.....	17.7	25.7	18.0	14.1	17.4	-	18.1

See footnote at end of table.

Table 4. Percent of infants of low birth weight by educational attainment of mother, age of mother, month of pregnancy prenatal care began, and race of child: Total of 41 reporting States and the District of Columbia, 1976—Con.

Age of mother, month of pregnancy prenatal care began and race	Total	Years of school completed by mother					
		0-8 years	9-11 years	12 years	13-15 years	16 years or more	Not stated
Black—Con.							
20-29 years	12.3	13.7	14.1	11.7	11.1	9.3	15.8
1st-2d month	11.4	12.1	13.6	11.1	10.7	8.7	15.3
3d month.....	11.7	14.2	13.2	11.2	10.4	10.3	15.0
4th-6th month.....	12.2	12.6	13.5	11.6	11.2	8.6	16.7
7th-9th month.....	11.4	11.9	13.0	10.5	9.6	11.6	11.7
No prenatal care	26.7	31.7	26.1	24.6	29.8	32.5	35.6
Not stated.....	14.8	15.9	17.5	14.2	13.9	8.7	14.9
30-39 years	12.1	13.0	13.4	11.6	11.0	9.9	15.7
1st-2d month	10.6	11.2	12.3	10.0	11.2	9.2	12.6
3d month.....	11.8	12.6	11.8	12.2	10.2	10.5	15.4
4th-6th month.....	12.2	13.6	13.6	11.7	9.3	9.7	11.6
7th-9th month.....	11.6	11.0	12.8	10.1	13.7	9.4	18.0
No prenatal care	28.4	24.7	26.7	30.1	32.4	*33.3	34.0
Not stated.....	15.0	15.3	17.3	12.8	13.5	13.7	17.9
40 years and over	13.1	13.1	13.1	13.1	11.0	9.8	20.5
1st-2d month	13.5	15.8	17.9	9.7	14.6	6.9	-
3d month.....	11.0	9.8	11.4	11.9	9.3	8.7	12.9
4th-6th month.....	12.1	10.7	10.1	14.7	7.1	23.1	23.9
7th-9th month.....	13.8	22.8	9.0	11.2	14.3	-	*12.5
No prenatal care	28.0	15.6	31.4	30.8	*8.3	-	*61.5
Not stated.....	15.5	10.5	13.0	16.7	*17.6	10.0	23.3

¹Includes races other than white and black.

Table 5. Percent of infants of low birth weight by race: United States, each region, geographic division, and State, 1976

Area	All races	White	Black	Other races
United States.....	7.3	6.1	13.0	6.9
Northeast.....	7.5	6.4	13.5	7.0
New England.....	6.5	6.1	11.9	7.0
Maine.....	5.8	5.8	3.3	7.9
New Hampshire.....	6.4	6.4	6.9	4.3
Vermont.....	6.1	6.1	10.3	7.7
Massachusetts.....	6.4	6.0	10.9	6.6
Rhode Island.....	6.6	6.3	11.5	5.7
Connecticut.....	7.2	6.3	13.2	8.7
Middle Atlantic.....	7.8	6.5	13.7	7.0
New York.....	8.2	6.8	13.7	7.0
New Jersey.....	7.5	6.2	13.3	6.0
Pennsylvania.....	7.3	6.2	14.1	7.9
North Central.....	6.8	5.8	13.5	6.3
East North Central.....	7.1	5.9	13.6	6.0
Ohio.....	6.9	5.9	13.5	6.8
Indiana.....	6.6	6.0	12.0	7.9
Illinois.....	7.6	5.9	13.8	5.8
Michigan.....	7.4	6.1	14.0	5.4
Wisconsin.....	5.8	5.4	12.7	5.7
West North Central.....	6.2	5.7	13.0	6.6
Minnesota.....	5.5	5.3	12.7	7.3
Iowa.....	5.9	5.8	10.9	7.0
Missouri.....	7.3	6.2	13.3	7.4
North Dakota.....	5.1	4.9	14.5	6.5
South Dakota.....	5.3	5.0	16.9	6.7
Nebraska.....	6.0	5.7	12.6	5.3
Kansas.....	6.4	5.9	12.9	4.9
South.....	8.0	6.4	12.8	6.9
South Atlantic.....	8.2	6.2	12.9	7.2
Delaware.....	7.8	6.2	13.0	13.0
Maryland.....	8.1	6.0	13.5	6.6
District of Columbia.....	12.0	6.9	13.0	6.2
Virginia.....	7.5	6.0	12.5	6.5
West Virginia.....	7.0	6.9	10.2	7.8
North Carolina.....	8.3	6.3	12.8	8.7
South Carolina.....	8.9	6.2	13.1	5.4
Georgia.....	8.7	6.4	12.9	4.8
Florida.....	7.8	6.1	12.6	7.7
East South Central.....	8.0	6.5	12.3	8.4
Kentucky.....	7.3	6.7	12.7	7.7
Tennessee.....	7.8	6.4	13.0	9.8
Alabama.....	8.2	6.3	11.7	9.8
Mississippi.....	9.0	6.3	12.2	6.4

Table 5. Percent of infants of low birth weight by race: United States, each region, geographic division, and State, 1976—Con.

Area	All races	White	Black	Other races
West South Central	7.8	6.5	13.3	6.4
Arkansas.....	7.9	6.5	12.3	5.4
Louisiana.....	9.0	6.3	13.1	6.4
Oklahoma.....	7.5	7.0	13.6	5.9
Texas.....	7.5	6.5	13.6	7.6
West.....	6.4	5.9	11.3	7.0
Mountain	7.1	6.9	13.0	7.3
Montana.....	6.7	6.4	12.7	9.2
Idaho.....	5.8	5.8	1.7	6.7
Wyoming.....	8.8	8.5	17.2	13.9
Colorado.....	8.8	8.5	13.9	10.3
New Mexico.....	8.1	8.2	12.6	7.3
Arizona.....	6.3	6.1	11.5	6.0
Utah.....	5.4	5.4	9.8	7.1
Nevada.....	7.7	7.0	14.6	5.5
Pacific.....	6.1	5.5	11.1	6.9
Washington.....	5.5	5.2	9.1	6.9
Oregon.....	5.4	5.2	12.7	6.2
California.....	6.2	5.5	11.2	6.5
Alaska.....	5.3	5.0	9.1	5.6
Hawaii.....	7.7	6.6	8.3	8.1

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APPENDIX TABLE

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APPENDIX I

TECHNICAL NOTES

Sources of Data

The data presented in this report are derived from birth certificates filed in each of the registration areas of the United States. Additional data are published annually by the National Center for Health Statistics in Volume I of *Vital Statistics of the United States* and are also available in the form of unpublished tabulations. A complete discussion of the sources, classification, and processing of natality data may be found in the technical appendixes of these volumes.

Reporting Areas

The birth certificates of all reporting areas include a question on weight at birth. However, not all areas request information on other characteristics discussed in this report. Table I shows the areas that request educational attainment of mother, dates of last live birth and fetal death (used to derive statistics on outcome of last pregnancy and interval since termination of last pregnancy), date last normal menstrual period began (for deriving period-of-gestation data), month of pregnancy prenatal care began, and marital status of mother. The size of the reporting area is, therefore, dependent on which characteristics are included in a particular analysis.

Sampling Rates

Data for 1950 and 1955 are based on the total file of birth records. Data for 1951-54, 1956-66, and 1968-71 are derived from 50-percent samples of birth records; data for 1967 are based in part on 20-percent and in part on 50-percent samples. Birth statistics for the years

1972-76 are based on 100 percent of the birth certificates from States participating in the Cooperative Health Statistics System (CHSS) and a 50-percent sample of births from all other States. Beginning in 1972, States providing data through CHSS were Florida, Maine, Missouri, New Hampshire, Rhode Island, and Vermont. The following States were added in subsequent years: Colorado, Michigan, and New York (excluding New York City) in 1973; Illinois, Iowa, Kansas, Montana, Nebraska, Oregon, and South Carolina in 1974; Louisiana, Maryland, North Carolina, Oklahoma, Tennessee, Virginia, and Wisconsin in 1975; and Alabama, Kentucky, Minnesota, Nevada, Texas, and West Virginia in 1976. A discussion of sampling procedures and sampling errors can be found in the technical appendix of Volume I of *Vital Statistics of the United States* for these years.

Residence Classification

All tables included in this report are by place of residence. Births to U.S. residents occurring outside this country are not included. All tables showing time series include data for Alaska beginning in 1959 and for Hawaii beginning in 1960.

Completeness of Reporting and Reporting Bias

There has been nearly complete reporting of weight at birth on birth certificates since 1959. During the period 1959-76, information was missing from less than 1 percent of all birth certificates.

For the years 1950-55, the birth certificates of Connecticut and Massachusetts did not in-

Table 1. States reporting educational attainment of mother, dates of last live birth and fetal death, date last normal menstrual period began, month of pregnancy prenatal care began, and marital status of mother: United States, 1976

[Items shown are those on the Standard Certificate of Live Birth. X denotes presence of item on the State certificate]

State	Educational attainment	Date of last live birth and fetal death	Date last normal menstrual period began	Month of pregnancy prenatal care began	Marital status of mother
Alabama.....	X	X	X	X	X
Alaska.....	X	X	X		X
Arizona.....	X	X	X	X	X
Arkansas.....					X
California.....		X	X	X	
Colorado.....	X	X	X	X	X
Connecticut.....	X	X		X	
Delaware.....	X	X	X	X	X
District of Columbia.....	X	X	X	X	X
Florida.....	X	X	X	X	X
Georgia.....	X	X	X	X	
Hawaii.....	X	X	X	X	X
Idaho.....					
Illinois.....	X	X	X	X	X
Indiana.....	X	X	X	X	X
Iowa.....	X	X	X	X	X
Kansas.....	X	X	X	X	X
Kentucky.....	X	X	X	X	X
Louisiana.....	X		X	X	X
Maine.....	X	X	X	X	X
Maryland.....	X	X	X	X	
Massachusetts.....	X	X	X	X	
Michigan.....	X	X	X	X	X
Minnesota.....	X	X	X	X	X
Mississippi.....	X	X	X	X	X
Missouri.....	X	X	X	X	X
Montana.....	X	X	X	X	
Nebraska.....	X	X	X	X	X
Nevada.....	X	X	X	X	
New Hampshire.....	X	X	X	X	X
New Jersey.....	X	X	X	X	X
New Mexico.....					
New York.....	X	X	X	X	
North Carolina.....	X	X	X	X	X
North Dakota.....	X	X	X	X	X
Ohio.....	X	X	X	X	
Oklahoma.....	X	X	X	X	X
Oregon.....	X	X	X	X	X
Pennsylvania.....	X				X
Rhode Island.....	X	X	X	X	X
South Carolina.....	X	X	X	X	X
South Dakota.....	X	X	X	X	X
Tennessee.....	X	X	X	X	X
Texas.....					X
Utah.....	X	X	X	X	X
Vermont.....	X	X	X	X	
Virginia.....	X				X
Washington.....		X	X	X	X
West Virginia.....	X	X	X	X	X
Wisconsin.....	X	X		X	X
Wyoming.....	X	X	X	X	X

clude a question on birth weight. In 1956 the information became available for Connecticut for part of the year, and for the years 1957-58 only Massachusetts failed to include this item on its live birth certificates. Beginning with 1959, birth weight was included on the birth certificates of all States. The birth certificate of New Jersey did not include a question on race for the years 1962 and 1963.

A "followback" survey covering births to

married women in 1972³³ permitted comparison of the reporting of birth weight on birth certificates with information reported on hospital records. There was perfect agreement in reported birth weight for 87 percent of the comparison cases and agreement in classifying a birth as either low birth weight or heavier weight in 96 percent of the cases.

NOTE: A list of references follows the text.



APPENDIX II

DEFINITION OF TERMS

Birth weight.—In almost all areas, birth weight is reported in terms of pounds and ounces rather than grams. However, the metric system has been used in tabulating and presenting the statistics to facilitate comparison with data published by other groups. The equivalents of the gram intervals in pounds and ounces are as follows:

500 grams or less	= 1 lb 1 oz or less
501-1,000 grams	= 1 lb 2 oz-2 lb 3 oz
1,000-1,500 grams	= 2 lb 4 oz-3 lb 4 oz
1,501-2,000 grams	= 3 lb 5 oz-4 lb 6 oz
2,001-2,500 grams	= 4 lb 7 oz-5 lb 8 oz
2,501-3,000 grams	= 5 lb 9 oz-6 lb 9 oz
3,001-3,500 grams	= 6 lb 10 oz-7 lb 11 oz
3,501-4,000 grams	= 7 lb 12 oz-8 lb 13 oz
4,001-4,500 grams	= 8 lb 14 oz-9 lb 14 oz
4,501 grams or more	= 9 lb 15 oz or more

For purposes of classification, infants weighing 2,500 grams or less at birth are considered to be of low birth weight. Infants for whom birth weight was not reported are excluded from the computation of percents and medians.

Period of gestation.—The period of gestation is defined as beginning with the first day of the last normal menstrual period (LMP) and ending with the day of birth. The LMP is used as the initial date since it can be more accurately determined than the date of conception, which usually occurs about 2 weeks after the LMP. Births occurring prior to 37 weeks of gestation are considered to be preterm or premature for purposes of classification. This distinction is in accordance with that adopted by the World

Health Organization Expert Group on Prematurity established in 1950.

Race and origin.—Births are classified according to the race or origin of the parents. The categories are "white," "black," "American Indian," "Chinese," "Japanese," "Hawaiian," "Filipino," and "other." The category "white" comprises births reported as white, Mexican, Puerto Rican, Cuban, and, prior to 1964, all births for which race or origin was not stated. The category "all other" comprises black, American Indian, Chinese, Japanese, Hawaiian and part-Hawaiian, Filipino, and "other." The "American Indian" category includes Alaskan and Canadian Indians, Eskimos, and Aleuts. Since the race of the mother and child are identical for most births, for ease and clarity in writing this report, the racial identification given to the mother is that of the child.

Outcome of and interval since last pregnancy.—Data on the outcome of and the interval since the termination of the last pregnancy are derived from the date of birth, date of last live birth, and date of last fetal death. Multiple births are excluded from the computation of these measures.

Urban places.—Urban places are classified according to the population enumerated in the 1970 Census of Population. They include incorporated cities of 10,000 population or more, and towns in New England, townships in New Jersey and Pennsylvania, and counties in other States that meet certain criteria. The remaining nonurban areas of the country and smaller urban places of less than 10,000 population are included in the category "balance of area."

APPENDIX III

DIRECT STANDARDIZATION OF PERCENT LOW BIRTH WEIGHT BY MARITAL STATUS AND MONTH OF PREGNANCY PRENATAL CARE BEGAN

To compare the percent low birth weight of infants born to married and unmarried mothers without the influence of differences in educational attainment and age composition, the direct method of standardization was used. The standard population was the distribution of all births in 1976, regardless of marital status, by educational attainment and age of mother. Standardization was performed separately for each racial group using the following formula:

$$m_1 = \frac{\sum_{e,a} m_{e,a} P_{e,a}}{P} \times 100$$

where

m_1 = standardized percent for given race,

$m_{e,a}$ = percent low birth weight for each education, age group for given race,

$P_{e,a}$ = number of births in 1976 for each education, age group for given race,

P = total standard population for given race.

Similarly, the percent low birth weight by month prenatal care began was standardized within each age group for differences in mother's educational attainment. For each age group, the standard population was the distribution of births for that age by the educational attainment of the mother. Standardization was done separately for each race. The percent of all other infants of low birth weight born in 1968 was standardized to eliminate the effect of changes in the proportions of infants delivered in and out of hospitals since 1950. The standard population used was the distribution of infants delivered in and out of hospitals in 1950.



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